Amendments to the Specification:

1. At page 8, following line 17 ending in "FIGS. 8a and 8b.", kindly insert the following:

FIG. 9a is a 2 dimensional view of a retroreflecting mirror, which is made by joining 2 mirrors at a 90 degree angle (the 3 dimensional retroreflector includes 3 mirror faces); notice that the incident and reflected beams are parallel, regardless of incident angle;

FIG. 9b illustrates reflection from a standard plane surface, where the angle of reflection is equal to the angle of incidence, and thus the incident and reflected beams are only parallel when the beam strikes at normal incidence; and

FIG. 9c shows the combination of a retroreflector and a partially reflecting planar surface (such as a corner cube), and the paths of light reflected from such an element.

2. At page 15, following line 18 ending in "with the workstation.", kindly insert the following:

If the gauge is an interferometer, more precise alignment can be achieved by using a corner cube 80 with a partially reflecting front surface 81 for step b) above (instead of an optical flat such as part 35). In this case, the interference between the beam reflected from the surface 86 and the beam reflected from the corner cube 88 can be measured, which provides a precise estimate of the angle G between the interferometer mainframe 12 and the

front surface normal 38. The reflected beam 88 from a properly fabricated corner cube 80 will be parallel to the incident beam 84. Likewise, the reflected wavefront 89 will be parallel to the incident wavefront 85. For an ordinary flat, however, the reflected beam 86 (or wavefront 87) is not in general parallel to the incident beam 84 (or wavefront 85). Instead, the angle between the reflected and incident beams is H, which is equal to two times angle of incidence G (the angle between incident beam 84 and surface normal 38). Therefore the interference between reflected wavefronts 87 and 89 provides a measurement of angle H and therefore angle G as well.

Since the angle G can be measured, it is possible to precisely adjust the alignment based on this measurement. Adjusting alignment of the interferometer mainframe 12 will change the orientation of incident beam 84 (and wavefront 85) and therefore angle of incidence G and measured angle H. Notice that the reflected beams 86 and 88 are only parallel when the angle of incidence G is exactly equal to zero (incident beam 84, surface normal 38, and reflected beams 86 and 88 are all parallel in this case). The interference will be "null" (minimum number of interference fringes) in this case.

If the front surface is perpendicular to the A axis, the interference between the front surface and retroreflected beams provides a direct measurement of interferometer's misalignment from the A-axis. In this case, a "null" interference measurement indicates perfect alignment of the interferometer axis and the A axis. If

the front surface is not perpendicular to the A-axis, a part-on-mount procedure can be used to separate the A-axis misalignment from errors due to the front surface not being orthogonal to the A-axis.

3. At page 15, following line 25 ending in "to the workstation.", kindly insert the following:

In some cases, an additional element, termed an "aperture converter", may be added after the gauge mainframe but before the focusing element. The function of the aperture converter is to obtain a different beam size by magnifying or demagnifying the beam (e.g. changing a 100 mm beam to a 25 mm beam). Aperture converters are usually afocal telescope assemblies (examples include in spyglasses, binoculars, and peepholes). The aperture converter can be aligned in the same manner as the mainframe, so that the beam angle emerging from the aperture converter is the same as that emerging from the gauge mainframe.

4. At page 17, following line 14 ending in "intersects the A axis.", kindly insert the following:

Note that for long radius focusing elements or diverging elements (where the point of convergence is behind the focusing element), steps b)ii) and b)iii) are not applicable. The resulting alignment therefore may not be as accurate. If, however, the gauge mainframe is an interferometer whose source has some spatial incoherence (and thus point 36 would not actually be a point but a

region with some size and shape associated with it), then an alternative alignment procedure is possible. During step c) (above), the following procedure can be performed after mounting the test part but before performing the part-on-mount sequence.

i) Activate the interferometer mainframe's partial spatial coherence mode (if not already).

ii) Introduce many fringes of misalignment (using the X, Y and Z axes). Note that the alignment will be easier if a significant portion of these fringes come from Z (i.e. the fringes look like bullseyes).

iii) Ensure that the interferometer mainframe is significantly out of focus, adjusting any focus control as necessary.

iv) At this point, a modulation "envelope" should be visible over the fringe pattern. The exact shape of the envelope depends on the fringe pattern, source coherence, and degree to which the system has been misfocused. Estimate the center point of the envelope pattern and its distance from the center of the bullseye fringes.

v) Adjust the tip-tilt controls of the transmission sphere to make the center point of the envelope pattern and the center point of the bullseye fringes coincident.

vi) The transmission sphere is now more carefully aligned. The misalignment fringes and misfocusing may be corrected at this time.

The rest of the focusing element alignment procedure can be performed as normal.

5. At page 17,line 20, after "the gauge reticle.", kindly insert the following:
At this time, an optional step may be performed for an interferometer: switch to fringe viewing mode, mount a corner cube, and use the transmission element tip/tilt adjustments to minimize the X and Y tilt observed in the fringe pattern between the corner cube retroreflection and the transmission flat.

6. At page 21, line 23, after "precision of the machine).", kindly insert the following:
After this step is completed, the gauge mainframe may be realigned in accordance with the second step, if desired.